UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF CHEMICAL SAFETY AND POLUTION PREVENTION/OFFICE OF PESTICIDE PROGRAMS

MEMORANDUM

DATE: Sept. 20, 2016

SUBJECT: Science review in support of label amendment to add aerial ultra-low volume (ULV) spray applications to the labels of Altosid Liquid Larvicide Mosquito Growth Regulator (SR5) and Zoecon RF -437 Mosquito Growth Regulator (SR20) products, containing 5% and 20 % w/w (S)- Methoprene, respectively, as their active ingredient.

Decision Number:	986966 986968
EPA File Symbol Number:	2724-446 and 2724-392
Chemical Class:	Biochemical
PC Code:	105402
CAS Number:	65733-16-6
Active Ingredients:	(S)-Methoprene
Tolerance Exemptions:	Non-food
MRID Numbers:	499355-01

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THROUGH: Russell Jones, Ph.D.
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TO: Menyon Adams, Regulatory Action Leader
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ACTION REQUESTED

Wellmark International is submitting efficacy data in MRID 499355-01 in support of label amendment to add aerial ULV application to the labels of Altosid Liquid Larvicide Mosquito Growth Regulator (SR5), and Zoecon RF -437 Mosquito Growth Regulator (SR20) products,

RECOMMENDATIONS AND CONCLUSIONS

Product Performance: Acceptable.

MRID 499355-01; Acceptable. The study shows that under the conditions of the test, the efficacy of the product ranges between 90 and 70 % average Emergence Inhibition. The study was conducted using SR5 (5%), EPA Reg. No. 2724-392 product, but the data is applicable to SR20 (20%) (EPA Reg. No. 2724-446, because both products were adjusted to be applied at the same rate (Refer to Calculations to adjust same application rate, below). The conditions of the test support the proposed label recommended rate and mode of application for control of mosquito larva using ULV aerial application. Data showed that wind speed variation influences the efficacy of the larvicide application. When average wind speeds fell below 1 mph (between 2.4 and 0 mph) average percent emergence inhibition (E.I.) decreased to 70 % (adjusted with Abbott's formula for control mortality = 4.7 %). Average percent E.I. = 70% ranged between 100 and 20 %. At wind speeds between 5 - 1 mph, average percent E.I. were 91 and 88 % (adjusted with Abbott's formula for control mortality = 2.5 and 12%, respectively). Average percent E.I. = 91 and 88 %, ranged between 100% and 67 %, and 100 and 70 %, respectively. Furthermore, data on *Aedes albopictus* supports label claim that the product is effective against Zika vector.

1) The registrant adequately explains that the rate per acre is adjusted for the difference in concentrations of active ingredient in each product to attain at the same rate of application, 0.010 or 0.013 lb / Acre, as tabulated below:

Calculations to adjust same application rate:

End use rate for ***2724-392***

Percent A.I.	lb A.I. / gallon concentrate.	Rate per acre (fl. oz.)	lb per acre
5%	0.43	3 (low)	0.010
5%	0.43	4 (high)	0.013

End use rate for ***2724-466***

Percent A.I.	lb A.I. / gallon concentrate.	Rate per acre (fl. oz.)	lb per acre

Percent A.I.	lb A.I. / gallon concentrate.	Rate per acre (fl. oz.)	lb per acre
20%	1.72	0.75 (low)	0.010
20%	1.72	1 (high)	0.013

2) In addition, label language for application instructions have been upgraded as follows:

"For aerial application to terrestrial sites, apply by fixed wing or rotary aircraft. Apply at the rate of 3 – 4 fluid ounces of product to acre diluted with water at a minimum of a 1:1 mix ratio with water. Apply using ULV equipped and capable aircraft. Unlike ULV sprays targeting flying mosquitoes, it is important that spray droplets deposit in targeted areas. Target terrestrial areas where mosquitoes breed. These sites include tires, open containers, garbage bins, birdbaths, and gutters, which hold small amounts of water. Spray equipment must be adjusted so that the volume median diameter (VMD) produced ranges from 60 microns ($Dv0.5 < 60\mu$) to 100 microns ($Dv0.5 < 100\mu$), and that 90% of the spray is contained in droplets smaller than 200 microns ($Dv0.9 < 200\mu$). Directions from the equipment manufacturer or vendor, pesticide registrant, or test facility using a wind tunnel and laser-based measurement instrument must be used to adjust equipment to produce acceptable droplet size spectra. Application equipment must be calibrated annually to confirm that nozzle flow rate(s) are accurate. Do not apply at altitudes below 100 feet unless using unmanned aircraft designed for low application heights. Apply when wind speed on the ground is $\geq$ 1 mph and $\leq$ 10 mph. Apply when wind factors promoting drift are low. For best results, use Global Positioning System (GPS) equipped aircraft."

STUDY SUMMARY

The objective of the study was to assess the effectiveness of Altosid Liquid Larvicide Mosquito Growth Regulator (SR5) when applied by ultra low volume (ULV). The product was tested at the lowest rate of application, 0.010 lb / Acres (3 fl oz. of active ingredient / Acre), using aerial ULV, target VMD > 60 microns. The target mosquito specie was Asian Tiger Mosquito, *Aedes albopictus*.

Experimental design and data analysis:

Application rate and Equipment:

A 1:1 water dilution of the product was applied by helicopter at the lowest application rate of 3 fl. oz. per acre. Nozzles were adjusted for 1,000 RPM; VMD was approximately 80 microns (droplet size), and flow rate was 142 fl. oz. / min. Each application consisted of 4 swaths from an altitude 100 ft above ground and flight speed of 60 MPH. Each swath covered 200 ft (swath width).

Application site:

The layout of the application site consisted of a 3 X 3 grid within an area of 300 sq. ft (200' L X 100' W). Nine treated sampling stations were marked with surveyors flags within the 200' L X 100' W application grid. Sampling stations were positioned to form 2 columns at opposing edges of the grid, and one column down the middle of the grid, for a total of 3 columns. Columns were approximately 50 feet apart and rows were approximately 100 feet apart in straight lines. Nine control sampling stations were setup outside the treatment grid in a column with 10 feet spacings. The droplet deposition assay consisted of 3 applications at different environmental conditions, each having 3 replicated sets of treated and control droplet collection samplers.

Droplet collection samples:

A food grade red dye was added to the larvicide solution for determination of droplets deposition. Droplet samples were collected on Parafilm squares placed on 90 mm DIA X 20 mm H Petri-dish to collect aerosolized larvicide droplets that impinged in the application area. The Parafilm squares were paired with a Kromekote cards at a grid sampling site that contained 9 sampling sites. The Kromekote card served as a qualitative measurement of droplets impinging in the grid. Following application, Droplet collection samples were sent to the lab in refrigerated packaging and stored in a freezer. They were removed from frozen storage 1 -2 hours prior to placement in mosquito breeding containers.

Larvicide testing:

The larvicide treatments were conducted in 3 series, modeling the 3 field applications. Nine treated replications and 9 non-treated replications were conducted simultaneously. Each replication contained 10 (2^{nd} and 3^{rd} Instar) *Aedes albopictus* larvae. The larvicide testing was conducted employing mosquito breeding containers of 16 oz. and 32 oz. capacity under laboratory conditions. Droplet collection Parafilm wax were placed in the bottom of the mosquito breeding containers. A volume of 164 ml dechlorinated water was added to each mosquito breeder. This water volume is equal to approximately 17 ml of water per square inch of droplet collection substrate (9.16 square inches) (approximately equal to a soft drink can half full). In addition, 1.5 ml of a 10% liver powder / water dilution was added as a food source to each breeding container. There were 10 breeding containers per replication. Observations were conducted after all pupae either emerged or died.

Efficacy was evaluated based on the test substances ability to prevent mosquito larvae from developing into adult mosquitoes. When emergence was complete, the number of dead pupae (DP), dead adults on the water surface (DA), and live adults (AA) in each container were recorded and percent emergence inhibition for each treatment application was calculated as follows:

Percent emergence inhibition (E.I.) = (DP + DA) / (AA + DA + DP) x 100

During the observation, close examination of adult mosquitoes that seemed to have emerged but were laying on the surface of the water was conducted. These adults were examined for evidence of attachment to the exuvia. If evidence was present, the adult was counted as a dead adult. Abbott's formula was used to adjust percent control when untreated control mortality was high.

Results:

Treatment 1: A 1:1 dilution of Altosid Liquid Larvicide 5% and water was applied at a rate of 3 ounces per acre from a helicopter at the speed of 60 mph at an altitude of 100 feet. The average wind speed was 3.61 mph; average temperature, 82°F, and relative humidity was 74%. The wind was light and variable with an average airspeed of 3.61 mph with highs speeds up to 5 mph and lows speeds down to 1 mph. The average percent E.I. ranged from 100% to 67%, the average percent E.I. corrected with Abbott's formula was 88%. The non-treated control mortality was 12%.

Treatment 2: A 1:1 dilution of Altosid Liquid Larvicide 5% and water was applied at a rate of 3 ounces per acre from a helicopter at the speed of 60 mph at an altitude of 100 feet.
The average wind speed was 2 mph; average temperature, 81 "F, and relative humidity was 76%. The wind was light and variable with an average airspeed of 2 mph with highs speeds up to 3.3 mph and lows speeds less than 1 mph. The average percent E.I. ranged from 100% to 70%, the average percent E.I. corrected with Abbott's formula was 91%. The non-treated control mortality was 2.5%.

Treatment 3: A 1:1 dilution of Altosid Liquid Larvicide 5% and water was applied at a rate of 3 ounces per acre from a helicopter at the speed of 60 mph at an altitude of 100 feet.
The average wind speed was 0.9 mph, average temperature, 81 °F: and relative humidity 77%. The wind was light and variable with an average airspeed of 0.9 mph with highs speeds up to 2.4 mph and lows speeds 0 mph. The average percent E.I. ranged from 100% to 20%, the average percent E.I. corrected with Abbott's formula was 70%. The non-treated control mortality was 4.7%.

Conclusion:

Data showed that wind speed variation influences the efficacy of the larvicide application.
At wind speeds between 5 - 1 mph, average percent E.I. were 91 and 88 % (adjusted with Abbott's formula for control mortality = 2.5 and 12%, respectively). Average percent E.I., 91 and 88 %, ranged between 100% and 67 %, and 100 and 70 %, respectively. Data showed that as average wind speeds fell below 1 mph (between 2.4 and 0 mph) average percent E.I. decreased to 70 % (adjusted with Abbott's formula for control mortality = 4.7 %). Average percent E.I. ranged between 100 and 20 %.